Title

Sixteen weeks of concurrent training do not increase the magnitude of the post-exercise hypotensive effect in hypercholesterolemic morbid obesity patients; [Sedici settimane di allenamento concomitante non aumentano l'entità dell'effetto ipotensivo post-esercizio in pazienti ipercolesterolemici con obesità patologica]

Abstract

BACKGROUND: It is widely known that concurrent exercise of moderate-intensity continuous plus resistance training (CTMICT+RT) decreases blood pressure in hypertensive and multiple patients with other comorbidities such as obesity, however, there is little information about the changes in the 'magnitude' of the post-exercise hypotension effect (PEH) observed from an 'acute' to after long-term 'chronic' exercise adaptations. To determine both acute and chronic effects of 16 weeks of exercise using CTMICT+RT in the magnitude of the systolic (SBP)/diastolic (DBP) blood pressure response of hypercholesterolemic patients with morbid obesity. Secondarily, to determine the CTMICT+RT effects on fasting plasma glucose, lipid profile and body composition. METHODS: A quasi-experimental study was designed where morbid obesity patients were assigned to normal cholesterol (Ncho, N.=19) and the hypercholesterolemia (Hcho, N.=13) groups according to their total cholesterol levels. The main outcomes were SBP/DBP blood pressure, and secondary outcomes; fasting plasma glucose, lipid profile outcomes, and body composition (body fat, lean mass, skeletal muscle mass) variables. RESULTS: Training-induced effects analyses revealed that 16 weeks of CTMICT+RT promoted significant chronic reductions in SBP in the Hcho group from pre- to post-10 min (135 vs. 119 mmHg, P=0.004). There were significant reductions in the Ncho group in Tc (188.0 vs. 117.4 mg/dL, P=0.050), and similarly, in triglycerides from before to after the CTMICT+RT intervention (188.0 vs. 117.4 mg/dL, P=0.050). The magnitude

of the PEH detected in SBP in the Hcho group (-6 mmHg) was not observed and decreased post-16 weeks of CTMICT+RT (-4 mmHg, P=0.535). CONCLUSIONS: Sixteen weeks of CTMICT+RT promote acute and chronic SBP decreases in hypercholesterolemic morbid obesity patients, being the acute 'magnitude' of SBP/DBP response not increased after CTMICT+RT

Authors

Delgado-Floody P.; Caamaño-Navarrete F.; Del-Cuerpo I.; Vargas C.A.; Martinez-Salazar C.; Valdés-Badilla P.; Herrera-Valenzuela T.; Hernandez-Martinez J.; Núñez-Espinoza C.; Guzmán-Muñoz E.; Alvarez C.

Author full names

Delgado-Floody, Pedro (57204769905); Caamaño-Navarrete, Felipe (56358312400); Del-Cuerpo, Indya (57834599300); Vargas, Claudia A. (57191882026); Martinez-Salazar, Cristian (14054607800); Valdés-Badilla, Pablo (56166091700); Herrera-Valenzuela, Tomás (56166128000); Hernandez-Martinez, Jordan (57207575562); Núñez-Espinoza, Cristian (58974834300); Guzmán-Muñoz, Eduardo (56520381200); Alvarez, Cristian (55676817500)

Author(s) ID

57204769905; 56358312400; 57834599300; 57191882026; 14054607800; 56166091700; 56166128000; 57207575562; 58974834300; 56520381200; 55676817500

Year

2024

Source title

Medicina dello Sport

Volume

77.0

Issue

1

Page start

38

Page end

52

Page count

14.0

DOI

10.23736/S0025-7826.24.04396-5

Link

https://www.scopus.com/inward/record.uri?eid=2-s2.0-85189660004&doi=10.23736%2fS0025-7826.24.04396-5&partnerID=40&md5=42af898d4a9e4d1a88e0dd9fbdc815c9

Affiliations

Department of Physical Education, Sport and Recreation, Universidad de La Frontera, Temuco, Chile; Department of Physical Education and Sport, Faculty of Sports Sciences, University of Granada, Granada, Spain; Physical Education Career, Universidad Autónoma de Chile, Temuco, Chile; Department of Physical Activity Sciences, Faculty of Education Sciences, Universidad Católica del Maule, Talca, Chile; Sports Coach Career, School of Education, Universidad Viña del Mar, Viña del Mar, Chile; Department of Physical Activity, Sports and Health Sciences, Faculty of Medical Sciences, Universidad de Santiago de Chile (USACH), Santiago, Chile; Department of Physical Activity Sciences, Universidad de Los Lagos, Osorno, Chile; Investigation Program in Sports, Society, and Healthy Living, Universidad de Los Lagos, Osorno, Chile; Escuela de Medicina, Universidad de Magallanes, Punta Arenas, Chile; Centro Asistencial Docente y de Investigación, Universidad de Magallanes, Punta Arenas, Chile; Interuniversity Center for Healthy Aging RED21993, Punta Arenas, Chile; School of Kinesiology, Faculty of Health, Universidad de Santo Tomás, Talca, Chile; Exercise and Rehabilitation Sciences Institute, School of Physical Therapy, Faculty of Rehabilitation Sciences, Universidad

Andres Bello, Santiago, Chile

Authors with affiliations

Delgado-Floody P., Department of Physical Education, Sport and Recreation, Universidad de La Frontera, Temuco, Chile, Department of Physical Education and Sport, Faculty of Sports Sciences, University of Granada, Granada, Spain; Caamaño-Navarrete F., Physical Education Career, Universidad Autónoma de Chile, Temuco, Chile; Del-Cuerpo I., Department of Physical Education and Sport, Faculty of Sports Sciences, University of Granada, Granada, Spain; Vargas C.A., Department of Physical Education, Sport and Recreation, Universidad de La Frontera, Temuco, Chile; Martinez-Salazar C., Department of Physical Education, Sport and Recreation, Universidad de La Frontera, Temuco, Chile; Valdés-Badilla P., Department of Physical Activity Sciences, Faculty of Education Sciences, Universidad Católica del Maule, Talca, Chile, Sports Coach Career, School of Education, Universidad Viña del Mar, Viña del Mar, Chile; Herrera-Valenzuela T., Department of Physical Activity, Sports and Health Sciences, Faculty of Medical Sciences, Universidad de Santiago de Chile (USACH), Santiago, Chile; Hernandez-Martinez J., Department of Physical Activity Sciences, Universidad de Los Lagos, Osorno, Chile, Investigation Program in Sports, Society, and Healthy Living, Universidad de Los Lagos, Osorno, Chile; Núñez-Espinoza C., Escuela de Medicina, Universidad de Magallanes, Punta Arenas, Chile, Centro Asistencial Docente y de Investigación, Universidad de Magallanes, Punta Arenas, Chile, Interuniversity Center for Healthy Aging RED21993, Punta Arenas, Chile; Guzmán-Muñoz E., School of Kinesiology, Faculty of Health, Universidad de Santo Tomás, Talca, Chile; Alvarez C., Exercise and Rehabilitation Sciences Institute, School of Physical Therapy, Faculty of Rehabilitation Sciences, Universidad Andres Bello, Santiago, Chile

Author Keywords

Hypercholesterolemia; Morbid obesity; Resistance training

Funding Details

Universidad de Granada, UGR; Universidad de La Frontera, UFRO, (DI23-3008); Universidad de La Frontera, UFRO; Spanish Ministry of Universities, (FPU19/02030)

Funding Texts

Funding text 1: The postdoctoral researcher Pedro Delgado-Floody has a contract through the program \u201CRecualificaci\u00F3n del Profesorado Universitario. Modalidad Mar\u00EDa Zambrano\u201D, Universidad de Granada/Ministerio de Universidades y Fondos Next Generation de la Uni\u00F3n Europea. This paper will be part of Indya Del-Cuerpo\u2019s doctoral thesis performed in the Biomedicine Doctorate Program of the University of Granada, with a grant from the Spanish Ministry of Universities (FPU19/02030). History Manuscript accepted: March 5, 2024. - Manuscript received: January 11, 2024.; Funding text 2: This study is part of the post-doctoral project (DIE22-0007), Universidad de La Frontera, and support by DI23-3008 project, Universidad de la Frontera, Temuco, Chile.

References

Krist AH, Davidson KW, Mangione CM, Barry MJ, Cabana M, Caughey AB, Et al., Behavioral counseling interventions to promote a healthy diet and physical activity for cardiovascular disease prevention in adults without cardiovascular disease risk factors: US preventive services task force recommendation statement, JAMA, 328,

pp. 367-374, (2022); Celis-Morales C, Salas C, Alvarez C, Aguilar Farias N, Ramirez Campillos R, Leppe J, Et al., Un mayor nivel de actividad física se asocia a una menor prevalencia de factores de riesgo cardiovascular en Chile: resultados de la Encuesta Nacional de Salud 2009-2010, Revista Medica de Chile, 143, pp. 1435-1443, (2015); Powell-Wiley TM, Poirier P, Burke LE, Despres JP, Gordon-Larsen P, Lavie CJ, Et al., Obesity and cardiovascular disease: a scientific statement from the American Heart Association, Circulation, 143, pp. e984-e1010, (2021); Choi D, Hendren S, Chang MI, Abunayla A, Battaglia MA, Cleary RK., The impact of obesity and morbid obesity on urgent/emergency colorectal resections: a regional database analysis, Surg Endosc, 36, pp. 1876-1886, (2022); Oppert J-M, Ciangura C, Bellicha A., Physical activity and exercise for weight loss and maintenance in people living with obesity, Reviews in Endocrine and Metabolic Disorders, pp. 937-949; Batrakoulis A, Jamurtas AZ, Metsios GS, Perivoliotis K, Liguori G, Feito Y, Et al., Comparative efficacy of 5 exercise types on cardiometabolic health in overweight and obese adults: A systematic review and network meta-analysis of 81 randomized controlled trials, Circ Cardiovasc Qual Outcomes, 15, (2022); Franklin BA, Eijsvogels TM, Pandey A, Quindry J, Toth PP., Physical activity, cardiorespiratory fitness, and cardiovascular health: A clinical practice statement of the American Society for Preventive Cardiology Part II: Physical activity, cardiorespiratory fitness, minimum and goal intensities for exercise training, prescriptive methods, and special patient populations, Am J Prevent Cardiol, 12, (2022); Mcleod JC, Currier BS, Lowisz CV, Phillips SM., The influence of resistance exercise training prescription variables on skeletal muscle mass, strength, and physical function in healthy adults: An umbrella review, J Sport Health Sci, 13, pp. 47-60, (2024); Ribeiro DAF, De Siqueira AFL, Rocha ASL, Araujo Furtado Almeida AE, Falcai A, Silva dos Santos Alianca A, Et al., Acute effects of dynamic explosive-type resistance exercise performed with elastic bands on blood pressure in stroke survivors, Med Sport, 75, pp. 288-297, (2022); Fidalgo ASF, Farinatti P, Borges JP, de Paula T, Monteiro W., Institutional guidelines

for resistance exercise training in cardiovascular disease: a systematic review, Sports Med, 49, pp. 463-475, (2019); Anderin C, Gustafsson U, Heijbel N, Thorell A., Weight loss before bariatric surgery and postoperative complications: data from the Scandinavian Obesity Registry (SOReg), Ann Surg, 261, pp. 909-913, (2015); Perone F, Pingitore A, Conte E, Halasz G, Ambrosetti M, Peruzzi M, Et al., Obesity and Cardiovascular Risk: Systematic Intervention Is the Key for Prevention, Healthcare, 11, (2023); Oldervoll LM, Gjestad R, Hilmarsen CC, Ose A, Gullikstad L, Wisloff U, Et al., Diastolic function and cardiovascular risk among patients with severe obesity referred to a lifestyle-program–a pilot study, Scand Cardiovasc J, 57, pp. 8-16, (2023); Rai RH, Singh RB, Mehta V, Sakshi, Asif M, Goyal K, Et al., Impact of exercise training duration on obesity and cardiometabolic biomarkers: a systematic review, J Diabetes Metab Dis, 22, pp. 155-174, (2023); Del Rosso S, Baraquet ML, Barale A, Defago MD, Tortosa F, Perovic NR, Et al., Long-term effects of different exercise training modes on cytokines and adipokines in individuals with overweight/ obesity and cardiometabolic diseases: A systematic review, meta-analysis, and meta-regression of randomized controlled trials, Obes Rev, 24, (2023); Tardif I, Auclair A, Piche M-E, Biertho L, Marceau S, Hould FS, Et al., Impact of a 12-week randomized exercise training program on lipid profile in severely obese patients following bariatric surgery, Obes Surg, 30, pp. 3030-3036, (2020); Marcon ER, Baglioni S, Bittencourt L, Lopes C, Neumann C, Trindade M., What is the best treatment before bariatric surgery? Exercise, exercise and group therapy, or conventional waiting: a randomized controlled trial, Obes Surg, 27, pp. 763-773, (2017); Khammassi M, Ouerghi N, Hadj-Taieb S, Feki M, Thivel D, Bouassida A., Impact of a 12-week high-intensity interval training without caloric restriction on body composition and lipid profile in sedentary healthy overweight/obese youth, Journal of exercise rehabilitation, 14, (2018); Alvarez C, Guede-Rojas F, Ramirez-Campillo R, Andrade DC, Vasquez-Gomez J, Rodriguez-Rodriguez F, Et al., Characterizing the interindividual postexercise hypotension response for two order

groups of concurrent training in patients with morbid obesity, Front Physiol, 13, (2022); Alvarez C, Ramirez-Campillo R, Martinez-Salazar C, Castillo A, Gallardo F, Ciolac EG., High-Intensity Interval Training as a Tool for Counteracting Dyslipidemia in Women, Int J Sports Med, 39, pp. 397-406, (2018); Pedersen LR, Olsen RH, Anholm C, Astrup A, Eugen-Olsen J, Fenger M, Et al., Effects of 1 year of exercise training versus combined exercise training and weight loss on body composition, low-grade inflammation and lipids in overweight patients with coronary artery disease: a randomized trial, Cardiovasc Diabetol, 18, (2019); Delgado-Floody P, Alvarez C, Cadore EL, Flores-Opazo M, Caamano-Navarrete F, Izquierdo M., Preventing metabolic syndrome in morbid obesity with resistance training: Reporting interindividual variability, Nutr Metab Cardiovasc Dis, 29, pp. 1368-1381, (2019); Nazari M, Minasian V, Hovsepian S., Effects of two types of moderate-and high-intensity interval training on serum salusin-α and salusin-β levels and lipid profile in women with overweight/ obesity, Diabetes Metab Syndr Obes, 13, pp. 1385-1390, (2020); Delgado-Floody P, Chirosa-Rios L, Caamano-Navarrete F, Valdes-Badilla P, Herrera-Valenzuela T, Monsalves-Alvarez M, Et al., Concurrent training and interindividual response in women with a high number of metabolic syndrome risk factors, Front Physiol, 13, (2022); Correa HL, Gadelha AB, Dutra MT, Neves R., Post-exercise hypotension following different resistance exercise protocols, Sport Sci Health, 18, pp. 1-9, (2022); Sriton B, Ruangthai R, Phoemsapthawee J., Postexercise hypotension and heart rate variability response after water-and land-based high-intensity interval exercise in prehypertensive obese men, J Exerc Rehabil, 18, (2022); Day C, Wu Y, Pescatello LS., Evaluating the Methodological Quality of Postexercise Hypotension Aerobic Exercise Interventions, Front Physiol, 13, (2022); Kajikawa M, Higashi Y., Obesity and Endothelial Function, Biomedicines, 10, (2022); Can M, Kocabas M, Yarar Z, Burgucu HC, Karakose M, Fatma Yerlikaya H, Et al., Evaluation of subclinical atherosclerosis in obese patients with three noninvasive methods: Arterial stiffness, carotid intima-media thickness,

and biomarkers of endothelial dysfunction, Arch Endocrinol Metab, 67, (2023); Fancher IS, Levitan I., Membrane Cholesterol Interactions with Proteins in Hypercholesterolemia-Induced Endothelial Dysfunction, Curr Atherosclerosis Rep, 25, pp. 535-541, (2023); Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) Final Report, Circulation, 106, (2002); Delgado-Floody P, Izquierdo M, Ramirez-Velez R, Caamano-Navarrete F, Moris R, Jerez-Mayorga D, Et al., Effect of high-intensity interval training on body composition, cardiorespiratory fitness, blood pressure, and substrate utilization during exercise among prehypertensive and hypertensive patients with excessive adiposity, Front Physiol, 11, (2020); Bruttini F, Bonetti A, Dragoni S, Gianfelici A., Ethical principles in sports medicine research and motor sciences, Med Sport, 72, pp. 474-476, (2019); Mancia G, Fagard R, Narkiewicz K, Redon J, Zanchetti A, Bohm M, Et al., 2013 ESH/ESC practice guidelines for the management of arterial hypertension: ESH-ESC the task force for the management of arterial hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC), Eur Heart J, 23, pp. 3-16, (2014); Hopkins WG, Marshall SW, Batter-ham AM, Hanin J., Progressive statistics for studies in sports medicine and exercise science, Med Sci Sports Exerc, 41, pp. 3-13, (2009); Amaro-Gahete FJ, De-la-O A, Jurado-Fasoli L, Martinez-Tellez B, . Ruiz J, Castillo MJ., Exercise training as a treatment for cardiometabolic risk in sedentary adults: are physical activity guidelines the best way to improve cardiometabolic health? The FIT-AGEING randomized controlled trial, J Clin Med, 8, (2019); Alvarez C, Ramirez-Velez R, Ramirez-Campillo R, Lucia A, Alonso-Martinez AM, Faundez H, Et al., Improvements cardiometabolic risk factors in Latin American Amerindians (the Mapuche) with concurrent training, Scand J Med Sci Sports, 29, pp. 886-896, (2019); Cornelissen VA, Fagard RH, Coeckelberghs E, Vanhees L., Impact of resistance training on blood pressure and other cardiovascular risk factors: a meta-analysis of randomized,

controlled trials, Hypertension, 58, pp. 950-958, (2011); Amaro-Gahete FJ, Ponce-Gonzalez JG, Corral-Perez J, Velazquez-Diaz D, Lavie CJ, Jimenez-Pavon D., Effect of a 12-week concurrent training intervention on cardiometabolic health in obese men: a pilot study, Front Physiol, 12, (2021); Alvarez C, Ramirez-Campillo R, Lucia A, Ramirez-Velez R, Izquierdo M., Concurrent exercise training on hyperglycemia and comorbidities associated: Non-responders using clinical cutoff points, Scand J Med Sci Sports, 29, pp. 952-967, (2019); Moraes MRd, Bacurau RFP, Simoes HG, Et al., Effect of 12 weeks of resistance exercise on post-exercise hypotension in stage 1 hypertensive individuals, J Hum Hypertens, 26, pp. 533-539, (2012); Hamer M., The anti-hypertensive effects of exercise: integrating acute and chronic mechanisms, Sports Med, 36, pp. 109-116, (2006); Wegmann M, Hecksteden A, Poppendieck W, Staffen A, Kraushaar J, Morsch A, Et al., Postexercise hypotension as a predictor for long-term training-induced blood pressure reduction: a large-scale randomized controlled trial, Clin J Sport Med, 28, pp. 509-515, (2018); Hecksteden A, Grutters T, Meyer T., Association between postexercise hypotension and long-term training-induced blood pressure reduction: a pilot study, Clin J Sport Med, 23, pp. 58-63, (2013); MacDonald J, Hogben C, Tarnopolsky M, MacDougall J., Post exercise hypotension is sustained during subsequent bouts of mild exercise and simulated activities of daily living, J Hum Hypertens, 15, pp. 567-571, (2001); Taylor CE, Jones H, Zaregarizi M, Cable NT, George KP, Atkinson G., Blood pressure status and post-exercise hypotension: an example of a spurious correlation in hypertension research?, J Hum Hypertens, 24, pp. 585-592, (2010); Wheeler MJ, Green DJ, Cerin E, Ellis KA, Heinonen I, Lewis J, Et al., Combined effects of continuous exercise and intermittent active interruptions to prolonged sitting on postprandial glucose, insulin, and triglycerides in adults with obesity: a randomized crossover trial, International J Behav Nutr Phys Act, 17, (2020); Sargeant JA, Gray LJ, Bodicoat DH, Willis SA, Stensel DJ, Nimmo MA, Et al., The effect of exercise training on intrahepatic triglyceride and hepatic insulin sensitivity: a systematic review and

meta-analysis, Obes Rev, 19, pp. 1446-1459, (2018); Kong Z, Sun S, Liu M, Shi Q., Short-term high-intensity interval training on body composition and blood glucose in overweight and obese young women, J Diabetes Res, 2016, (2016)

Correspondence Address

C. Alvarez; Exercise and Rehabilitation Sciences Institute, School of Physical Therapy, Faculty of Rehabilitation Sciences, Universidad Andres Bello, Santiago, Autopista Concepción-Talcahuano 7100, 7591538, Chile; email: cristian.alvarez@unab.cl

Publisher

Edizioni Minerva Medica

ISSN

00257826

CODEN

MESPA

Language of Original Document

English

Abbreviated Source Title

Med. Sport

Document Type

Article

Publication Stage

Final

Source

Scopus

EID

2-s2.0-85189660004